

## Structures, Processes, and Responses in Animals

### 6-3 The student will demonstrate an understanding of structures, processes, and responses in animals that allow them to survive and reproduce. (Life Science)

#### 6.3.1 Compare the characteristic structures of invertebrate animals (including sponges, segmented worms, echinoderms, mollusks, and arthropods) and vertebrate animals (fish, amphibians, reptiles, birds, and mammals).

**Taxonomy level:** 2.6-B Understand Conceptual Knowledge

**Previous/Future knowledge:** Students have previously studied animals in 2<sup>nd</sup> grade, 3<sup>rd</sup> grade, and 4<sup>th</sup> grade. In 4<sup>th</sup> grade (4-2.1), students studied specific vertebrate animal groups and their characteristics but not specific invertebrate animal groups. Students will focus on the study of the human body in 7<sup>th</sup> grade.

**It is essential for students to** know that the Animal Kingdom is divided into 35 different phyla.

- These phyla can be classified into two groups (vertebrates or invertebrates) based on external and internal physical characteristics.
- However, all animals share several common characteristics:
  - Their bodies are multi-cellular.
  - They are heterotrophs (cannot make their own food) and must get their energy by eating plants or other animals.
  - Their major functions are to obtain food and oxygen for energy, keep their internal conditions in balance, move, and reproduce.

Vertebrates comprise only one phylum of animals. They include fish, amphibians, reptiles, birds, and mammals. Vertebrates share certain physical characteristics:

- They have backbones, an internal skeleton (*endoskeleton*), and muscles.
- They have blood that circulates through blood vessels and lungs (or gills) for breathing.
- They have a protective skin covering.
- Most have legs, wings, or fins for movement.
- They have a nervous system with a brain that processes information from their environment through sensory organs.

Vertebrates differ in the way that they control their body temperature.

- In some (fishes, amphibians, and reptiles), their body temperature is close to that of their environment. They are considered *cold-blooded*, or *ectothermic*.
- In others (birds and mammals), their body temperature stays constant regardless of the temperature of the environment. They are called *warm-blooded*, or *endothermic*.

Examples of vertebrates include:

#### *Fish*

- Are cold-blooded (ectothermic); obtain dissolved oxygen in water through gills; most lay eggs; have scales; have fins; and live in water.

#### *Amphibians*

- Are cold-blooded (ectothermic); most can breathe in water with gills as young, and breathe on land with lungs as adults; go through metamorphosis; lay jelly-like eggs.
- The major groups of amphibians are frogs, toads, and salamanders.

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- Frogs and salamanders have smooth, moist skin, through which they can breathe and live part of their life in water and part on land.
- Toads have thicker, bumpy skin and live on land.

#### *Reptiles*

- Are cold-blooded (ectothermic); breathe with lungs; most lay eggs, although in some the eggs hatch inside the female; and have scales or plates.

#### *Birds*

- Are warm-blooded (endothermic); breathe with lungs; lay eggs; have feathers; and have a beak, two wings, and two feet.

#### *Mammals*

- Are warm-blooded (endothermic); breathe with lungs; most have babies that are born live; have fur or hair; and produce milk to feed their young.

Invertebrates comprise the remaining phyla of the Animal Kingdom. They include sponges, segmented worms, echinoderms, mollusks, and arthropods. Invertebrates share certain characteristics:

- They do not have backbones or internal skeletons.
- Some have external skeletons, called *exoskeletons*.

Examples of invertebrates include:

#### *Sponges*

- Very simple animals that have many *pores* (holes) through which water flows.
- Water moves into a central cavity and out through a hole in the top.
- Sponges obtain their food and eliminate wastes through this passage of water.
- They have specialized cells for obtaining food and oxygen from the water.

#### *Segmented worms*

- Have long tube-like bodies that are divided into segments.
- They are the simplest organisms with a true nervous system and blood contained in vessels.
- A long digestive tube runs down the length of the worm's inner body.
- Worms take in dissolved oxygen from the water through their skin.
- Examples of segmented worms may be earthworms and leeches.

#### *Echinoderms*

- Have *arms* that extend from the middle body outwards.
- They have tube feet that take in oxygen from the water and spines.
- Examples may be sea stars, brittle stars, sea cucumbers, or sea urchins.

#### *Mollusks*

- Have soft bodies; most have a thick muscular foot for movement or to open and close their shells.

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- They have more developed body systems than sponges or worms.
- They take in oxygen through gills or lungs, and some have shells.
- Examples may be slugs, snails, clams, and octopuses.

#### *Arthropods*

- Have jointed legs, segmented bodies, and some have wings.
- They have hard outer coverings called *exoskeletons*.
- They obtain oxygen from the air through gills or air tubes.
- Examples may be insects, arachnids, and crustaceans.

**It is not necessary for students to** know the classification systems for the vertebrates and invertebrates, life cycles of the various animal groups, other types of worms, other groups of invertebrates, or the major organs, systems or complete anatomy of each group of animals.

#### **Assessment Guideline:**

The objective of this indicator is to *compare* the characteristic structures of vertebrates and invertebrates; therefore, the primary focus of assessment should be to detect ways that these organisms are alike and different. However, appropriate assessments should also require students to *identify* specific invertebrate and vertebrate groups based on a description of characteristics; *illustrate* the different kinds of vertebrates and invertebrates by their distinctive differences; or *classify* an animal into a particular group based on its characteristics.